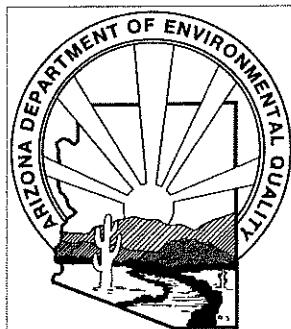
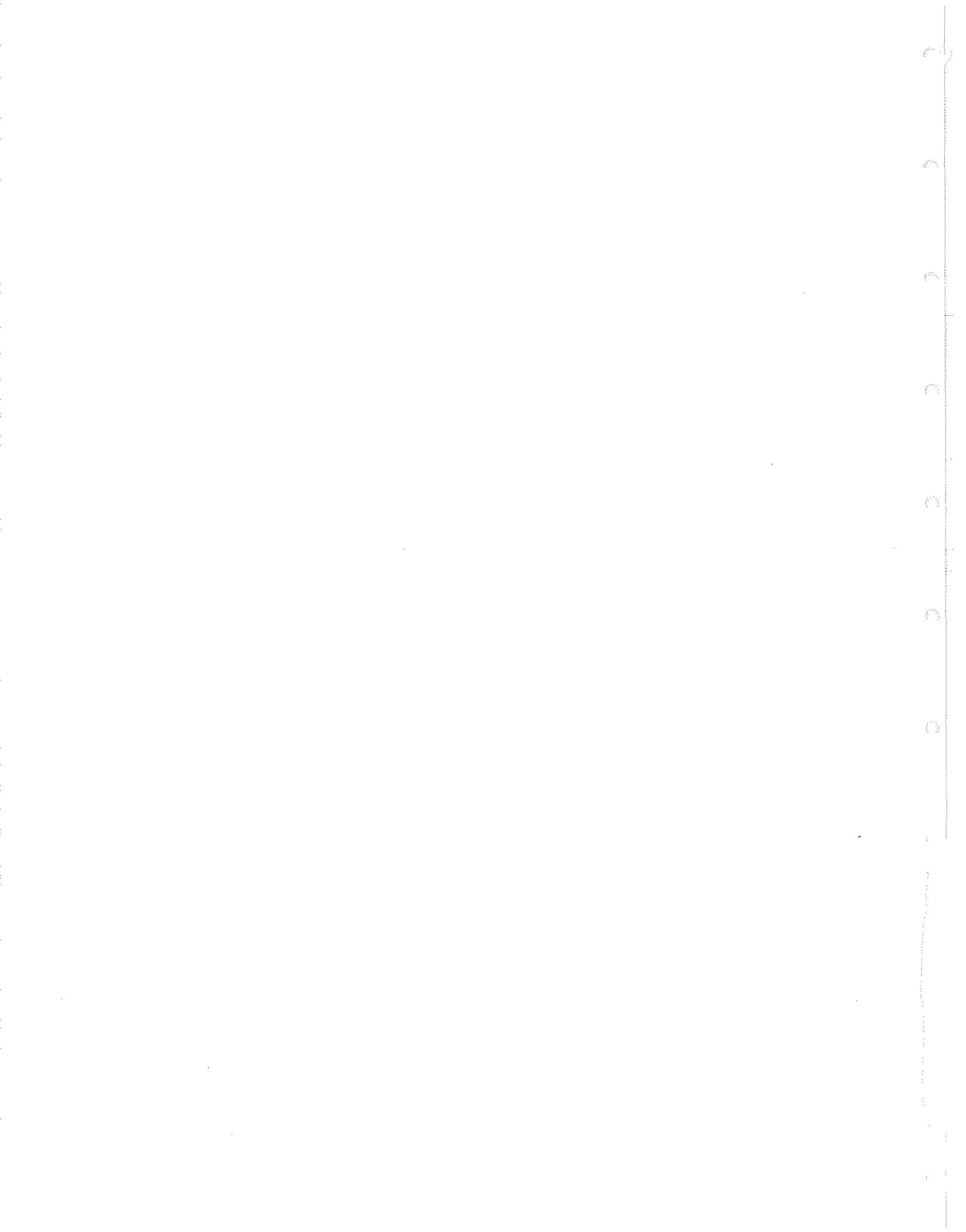


A R I Z O N A
D E P A R T M E N T O F
E N V I R O N M E N T A L
Q U A L I T Y

1997 Air Quality Data for Arizona





1997

**AIR QUALITY DATA
FOR ARIZONA**

Annual Report

**Honorable Jane Dee Hull
Governor
State of Arizona**

**Arizona Department of Environmental Quality
Russell F. Rhoades, Director**

The Arizona Department of Environmental Quality shall preserve, protect and enhance the environment and public health and shall be a leader in the development of public policy to maintain and improve the quality of Arizona's air, land and water resources.

ACKNOWLEDGMENTS

The Arizona Department of Environmental Quality extends sincere appreciation to the sampler operators named below for their services, which included operating particulate samplers and mailing the samples collected at the State's monitoring sites.

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Naco	Marvin Wooten
Nelson	Perry Curly
Nogales	Ricardo Maldonado & Ben Stapleton
Organ Pipe Cactus National Monument	Ami Pate
Paul Spur	John Cryar
Payson	Alice Turner
Prescott	Vince Gianfrancesco
Rillito	Carl Gremmler
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Show Low	Denis Harger & Maria Dugger
Yuma	Leah Hamilton

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I. AIR QUALITY STANDARDS

(National Ambient Air Quality Standards)

EPA has set NAAQS for seven pollutants, which are summarized in Table 1. For each pollutant EPA has adopted primary standards to protect public health and secondary standards to protect public welfare. The states are required to adopt standards which are at least as stringent as the NAAQS. In Arizona, ambient air quality standards are identical to the federal NAAQS. These seven pollutants are referred to as criteria pollutants because criteria documents are prepared which summarize effects on public health and welfare.

A brief summary of the health and welfare effects which have been considered prior to setting ambient air quality standards is given below. It should be noted that PM_{2.5} and PM₁₀ are defined as particles equal to or less than 2.5 and 10 microns in diameter, respectively.

Pollutant

Carbon Monoxide	Impairs the ability of blood to carry oxygen in the body. Cardiovascular system is primarily affected, causing angina pain in persons suffering from cardiac disease and leg pain in persons suffering from cardiac arterial disease. Affects other mammals in a similar manner.
Lead	Damages the cardiovascular, renal, and nervous systems resulting in anemia, brain damage, and kidney disease. Preschool age children are particularly susceptible to brain damage effects. Similar effects observed in other mammals. Others adverse effects on animals, microorganisms, and plants.
Nitrogen Dioxide	Impairs the respiratory system, causing a high incidence of acute respiratory diseases. Preschool children are especially at risk. Damages certain plants and materials. Degrades visibility due to its brownish color and its conversion to nitrate particles. Nitrate particles are also a major component of acid deposition.

Ozone	Damages the respiratory system, reducing breathing capacity and causing chest pain, headache, nasal congestion and sore throat. Individuals with chronic respiratory diseases are especially susceptible to ozone. Injures certain plants, trees, and materials.
PM _{2.5} /PM ₁₀	Causes irritation and damage to the respiratory systems, resulting in difficult breathing, inducement of bronchitis, and aggravation of existing respiratory diseases. Also, certain polycyclic aromatic hydrocarbons in PM _{2.5} /PM ₁₀ are carcinogenic. Individuals with respiratory and cardiovascular diseases, children, and elderly persons are at greatest risk. Secondary effects include soiling, damaging materials and impairment of visibility. Sulfates and nitrates in PM _{2.5} /PM ₁₀ are responsible for acid deposition which damages materials, plants, and trees and acidifies surface waters, thereby harming aquatic life.
Sulfur Dioxide	Aggravates asthma, resulting in wheezing, shortness of breath, and coughing. Healthy persons exhibit the same responses at higher exposures. Asthmatics and atopic individuals are the most sensitive groups, followed by those suffering from bronchitis, persons with emphysema, bronchiectasis, cardiovascular disease, the elderly, and children. Damages certain plants and materials. Causes visibility impairment and acid deposition due to its conversion to sulfate particles.

The Clean Air Act requires EPA to periodically review the NAAQS (National Ambient Air Quality Standards), and adopt revisions when new information indicates that changes are required. As a result, EPA revised the ozone standard in July, 1997 from a 1-hour standard of 0.12 ppm to an 8-hour standard of 0.08 ppm, based on information indicating that the chronic effects of ozone correlate better with 8-hour exposures than with 1-hour exposures. EPA also changed the procedure for determining compliance with the standards. The new procedure requires determining the fourth highest 8-hour concentration for each year for three consecutive years. These three values are then averaged to determine the average fourth highest value for the

3-year period. This value must be 0.084 ppm or less to indicate compliance (values are rounded to the nearest 0.01 ppm).

In regard to PM₁₀, EPA made one minor change to the standards by modifying the procedure for determining compliance with the 24-hour standard. The new procedure requires determining the 99th percentile value for each year for three consecutive years. These three values are then averaged to determine the average 99th percentile for the 3-year period. This value must be 154 ug/m³ or less to indicate compliance (values are rounded to the nearest 10 ug/m³). For PM_{2.5} EPA set standards of 65 ug/m³ for a 24-hour averaging time and 15 ug/m³ for an annual period. Compliance is determined in a similar manner as for the PM₁₀ standards. The only exception is the use of the 98th percentile to determine compliance with the 24-hour PM_{2.5} standard.

Table 1
Summary of Ambient Air Quality Standards
State and Federal Standards

Pollutant	Averaging Time	Primary	Secondary
Carbon Monoxide	1-hr 8-hr	35 ppm 9 ppm	None
Nitrogen Dioxide	Annual	100 ug/m ³	100 ug/m ³
Ozone ^a	1-hr 8-hr	0.12 ppm 0.08 ppm	0.12 ppm 0.12 ppm
PM _{2.5} ^b	24-hr Annual	65 ug/m ³ 15 ug/m ³	65 ug/m ³ 15 ug/m ³
PM ₁₀	24-hr Annual	150 ug/m ³ 50 ug/m ³	150 ug/m ³ 50 ug/m ³
Sulfur Dioxide	3-hr 24-hr Annual	--- --- 365 ug/m ³ State 0.14 ppm Federal 80 ug/m ³ State 0.03 ppm Federal	1300 ug/m ³ State 0.5 ppm Federal --- --- --- ---
Lead	Calendar Qtr.	1.5 ug/m ³	1.5 ug/m ³

Summary of Emergency Episode Levels
State and Federal

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon Monoxide	1-hr 4-hr 8-hr	---	---	---	125 ppm 75 ppm 50 ppm
Nitrogen Dioxide	1-hr 24-hr	0.60 ppm 0.15 ppm	1.20 ppm 0.30 ppm	1.60 ppm 0.40 ppm	2.00 ppm 0.50 ppm
Ozone	1-hr	0.20 ppm	0.40 ppm	0.50 ppm	0.60 ppm
PM ₁₀	24-hr	350 ug/m ³	420 ug/m ³	500 ug/m ³	600 ug/m ³
Sulfur Dioxide	24-hr	0.30 ppm	0.60 ppm	0.80 ppm	1.00 ppm

a. In July, 1997 the standard was revised from 0.12 ppm for a 1-hour average to 0.08 ppm for an 8-hr average.

b. In July, 1997 the EPA adopted standards for PM_{2.5}.

II. AIR QUALITY MONITORING NETWORKS

A. MONITORING NETWORKS

In Arizona, ambient air monitoring for criteria pollutants is conducted by a number of governmental agencies and regulated industries. Criteria pollutants are those pollutants for which federal and State air quality standards have been adopted. They include carbon monoxide, lead, nitrogen dioxide, ozone, PM₁₀, PM_{2.5}, and sulfur dioxide. Federal and state air quality standards for these pollutants are listed in Table 1. A list of the monitoring network operators and the areas monitored is given below.

<u>Agency or Industry</u>	<u>Area Monitored</u>
Arizona Portland Cement Co.	Rillito
Arizona Public Service Co.	Joseph City
ASARCO, Inc.	Hayden
BHP Copper, Inc..	San Manuel
Cyprus Miami Mining Corp.	Miami
Maricopa County Environmental Services Dept. .	Phoenix Urban Area
National Park Service	National Monuments and Parks
Pima County Dept. of Environmental Quality . .	Tucson Urban Area
Pinal County Air Quality Control District	Pinal County
Praxair, Inc.	Kingman
Salt River Project	Page and St. Johns
Southern California Edison Co.	Bullhead City, AZ and Laughlin, NV
Tucson Electric Power Co.	Tucson and Springerville

Maps indicating the locations of the Phoenix, Tucson and statewide monitoring stations are provided in Figures 1, 2, and 3. The

Maricopa, Pima, and Pinal Counties networks are operated primarily to monitor urban-related air pollution. In contrast, the industrial networks are operated to monitor emissions from certain industrial facilities. State monitors are employed for a variety of purposes, including urban, industrial, rural and background surveillance.

B. DATA REPORTING/QUALITY ASSURANCE

Ambient air quality data collected in 1997 by the various networks above are summarized in Section II. of this report. In addition, Maricopa and Pima Counties and some of the companies publish annual reports which include summaries of their data.

Raw data files are maintained by each of the network operators. In addition, the U.S. Environmental Protection Agency (EPA) stores raw data submitted quarterly by Maricopa and Pima Counties and the State. EPA analyzes these data for the purposes of evaluating progress in attaining and maintaining the NAAQS and reporting trends in air quality to the President and Congress.

Maricopa and Pima Counties report pollutant concentrations in the Phoenix and Tucson urban areas each day to the public via television, radio, newspapers and telephone. The data are reported in pollutant standard index (PSI) units, that is, units of concentrations relative to the standards. These reports include the descriptor words "good", "moderate", "unhealthy", "very unhealthy", or "hazardous", depending on pollutant levels.

The industrial operators submit either monthly or quarterly data reports to the state, depending on the type of facility. In addition, they are required to report any exceedance of an air quality standard by the next working day. The report includes an explanation of the causes of the exceedance and corrective actions to be taken, if possible, to prevent future occurrences.

To ensure that valid data are obtained, each network operator conducts a quality assurance program in accordance with state and federal requirements.

C. SPECIAL MONITORING STUDIES

In addition to monitoring criteria pollutants at fixed sites, the State conducts special monitoring studies. These studies address several issues including:

- Visibility in urban areas.
- Visibility in Class I (pristine) areas.
- Hazardous Air Pollutants (HAPS).
- Border area air quality.
- Volatile organic compounds (ozone nonattainment plans)

Visibility is monitored in the urban areas of Phoenix and Tucson to assess spatial and temporal variations and to evaluate sources of visibility reduction. This study is a follow-up to the research performed by DRI (Desert Research Institute) in Phoenix in 1989-1990 and by ENSR Consulting and Engineering in Tucson in 1992-1993, the so-called brown cloud studies. In these studies DRI and ENSR performed special monitoring to determine which pollutants have the greatest impact on visibility. They also determined the major sources of these pollutants. However, since this research was performed in the fall and winter seasons, it is necessary to conduct year round monitoring to assess seasonal changes in visibility.

Visibility is also monitored in federally designated Class I areas, which are pristine places where visibility protection is required by the Clean Air Act. There are 12 Class I areas in Arizona, which are managed either by the National Park Service or the U.S. Forest Service. Through the IMPROVE (Interagency Monitoring of Protected Visual Environments) Program, visibility information has been collected at a few of the Class I areas over the course of the last 12 or so years. In order to more fully understand visual air quality in all Class I areas in Arizona, the State has taken the lead in a cooperative program with the Park Service and the Forest Service in expanding the number of monitoring locations. The program is presently being implemented, and seven sites were operational by June, 1998. These are at Saguaro National Monument at Mt. Ord for the Mazatzal Wilderness, at Humboldt Peak for the Pine Mtn. Wilderness, at Muleshoe Ranch for Galiuro Wilderness, at Rucker Canyon for Chiricahua Wilderness, at McFadden Peak for Sierra Ancha Wilderness, and at Sycamore Canyon Wilderness. Later in 1998, monitoring equipment will

be in place at Green's Peak for Mt. Baldy Wilderness.

HAPS monitoring was initiated in 1993 by the State in conjunction with a study of the impacts of HAPS in Arizona. In addition to monitoring, the study involved an inventory of sources and emissions and an assessment of health risks due to HAPS. This project was completed, and a report on the study was submitted to the legislature in 1995.

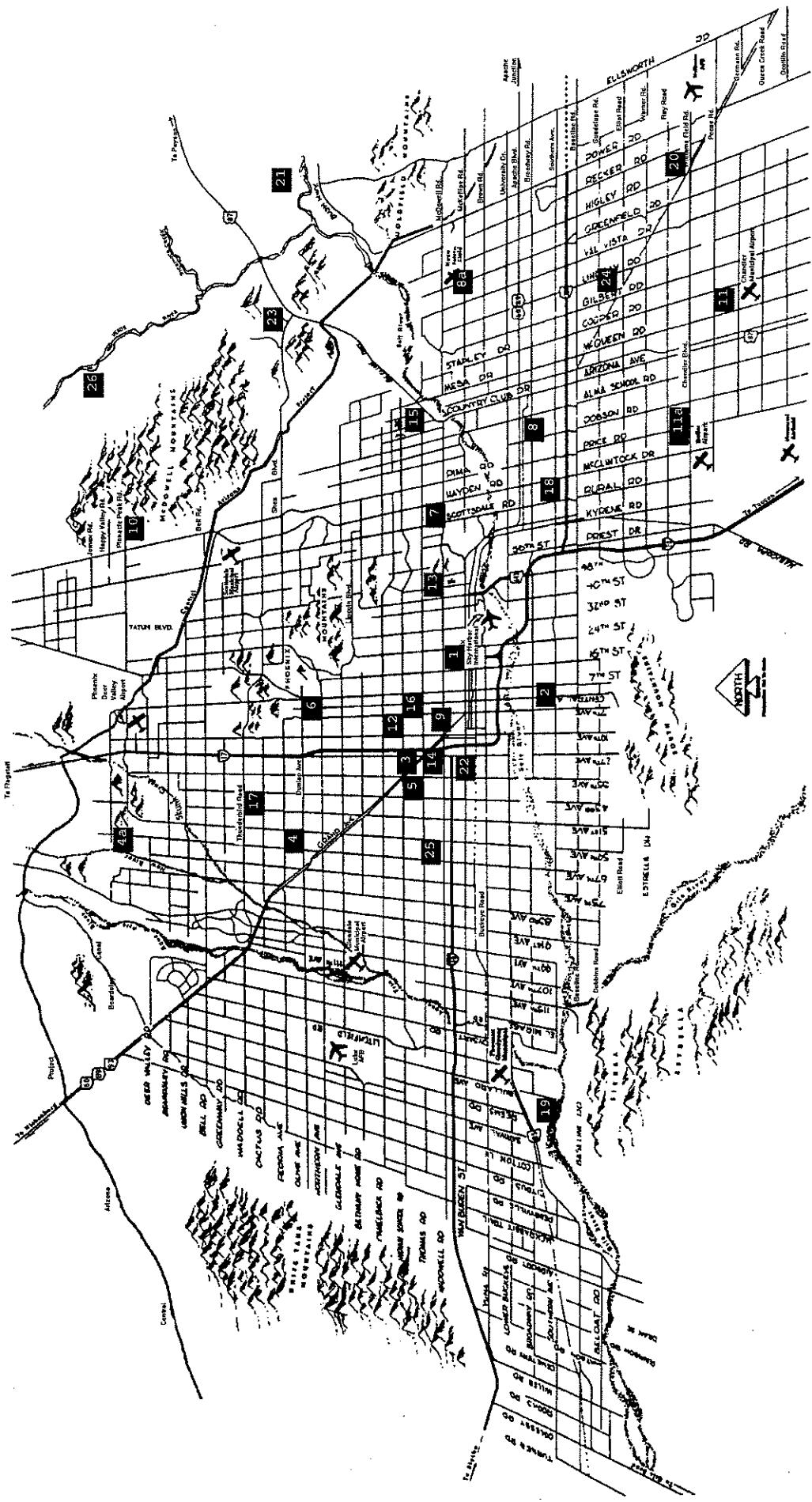
On the Arizona-Mexico border special monitoring studies are conducted to evaluate the air quality impacts of urban and industrial activities. Preliminary studies conducted in 1990 found that a majority of PM₁₀ pollution measured on the U.S. side of the border originated in Mexico and was transported by winds which, on nearly a daily basis, cause air pollution exchange between the two countries. Starting in 1994, a second study in the Nogales area was done. In this study, monitoring for PM₁₀ and HAPS was performed in both Nogales, Mexico and Nogales, Arizona. An inventory of PM₁₀ and HAPS emissions on both sides of the border was completed in July, 1997; the results will be used in air quality modeling studies for human health risk assessment, to apportion source impacts, and for evaluation of potential controls. In the summer of 1998, a similar PM₁₀ /HAPS monitoring and emissions inventory investigation will be initiated in the Douglas-Aqua Prieta area.

In the Phoenix Metropolitan Area, enhanced monitoring of ozone, its photochemical precursors, and meteorology is planned for 1999. This monitoring is required because the the Phoenix Metropolitan Area was recently classified as serious for ozone nonattainment planning purposes, based on ozone concentrations monitored in recent years. Federal legislation and regulations call for the establishment of "Photochemical Assessment Monitoring Stations" (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme. ADEQ will be responsible for as many as five PAMS, and has an ongoing effort to determine the most cost effective and technically sound method to meet the Federal Clean Air Act's enhanced ozone monitoring requirement. This program will evolve as the PAMS program continues to be implemented, over the next few years. A PAMS network description, or an approved alternative network description, including a schedule for implementation, will be submitted to EPA in the near future.

PM_{2.5} monitoring is scheduled to begin in November, 1998 through-out Arizona, as a result of EPA adopting PM_{2.5} standards in 1997. Planning for this monitoring program has been accomplished through a cooperative effort by ADEQ, Maricopa, Pima, and Pinal Counties, Pima

Association of Governments, and EPA. Samplers will be operated in the major metropolitan areas of Phoenix and Tucson, and in other areas of the State to determine compliance with PM_{2.5} standards. PM_{2.5} samplers will also be operated at remote sites to monitor the transport of PM_{2.5} from urban areas to pristine Class I areas where visibility protection is a major concern. In addition, sampling will be conducted at remote sites to measure background concentrations of PM_{2.5} in various regions of Arizona. A centralized laboratory for the distribution of filters and gravimetric analysis of PM_{2.5} samples will be established at ADEQ. For data management purposes, ADEQ will establish a database to track filter processing, to record field, laboratory, and QA/QC data, and to prepare reports.

FIGURE 1
MARICOPA COUNTY MONITORING NETWORK



Map Key for Figure 1
Maricopa County Monitoring Network

Map Number	Site
1	1845 E.Roosevelt St - Phoenix
2	4732 S.Central Ave - Phoenix
3	3315 W.Indian School Rd - Phoenix
4	6000 W.Olive Ave - Glendale
4a	6801 W.Deer Valley Rd - Glendale/Arrowhead
5	3847 W.Earll Dr - Phoenix
6	601 E.Butler Dr - Phoenix
7	2857 N.Miller Rd - Scottsdale
8	Broadway Rd & Brooks - Mesa
8a	4530 E.McKellips Rd- Mesa
9	1826 W.McDowell Rd - Phoenix
10	25000 N.Windy Walk - Scottsdale/Pinnacle Peak
11	1475 E.Pecos Rd - Chandler
11a	163 S.Price Rd - Chandler
12	4530 N.17th Ave - Phoenix
13	2035 N.52nd St - Phoenix
14	27th Ave/Grand Ave/Thomas Rd - Phoenix
15	10005 E.Osborn Dr - Scottsdale
16	3905 N.7th Ave - Phoenix
17	4701 W.Thunderbird Rd - Phoenix
18	3340 S.Rural Rd - Tempe
19	15099 W.Casey Abbott - Goodyear/Estrella
20	15500 S.Higley - Higley
21	Sheriff's Station - Blue Point
22	I-10/27th Ave - Phoenix
23	16426 E.Palisades - Fountain Hills
24	535 N.Lindsay - Gilbert
25	6180 W.Encanto - Phoenix
26	Forest Rd & Rio Verde Dr - Rio Verde
*	Nat. Forest Service - Humboldt Mtn - See Fig.3
*	Nat. Forest Service - Mount Ord - See Fig.3
*	155 N.Wegner St - Wickenburg - See Fig.3

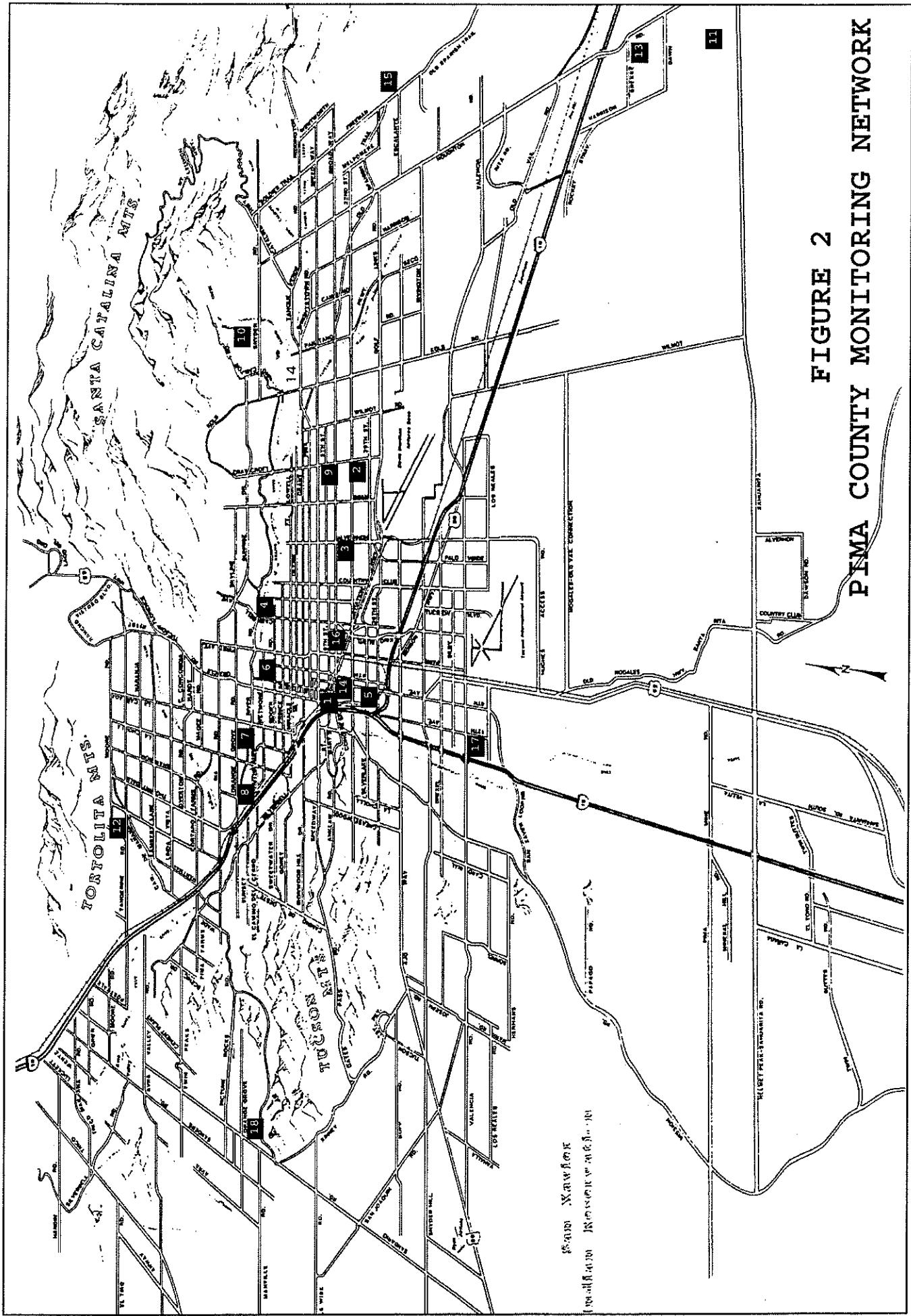
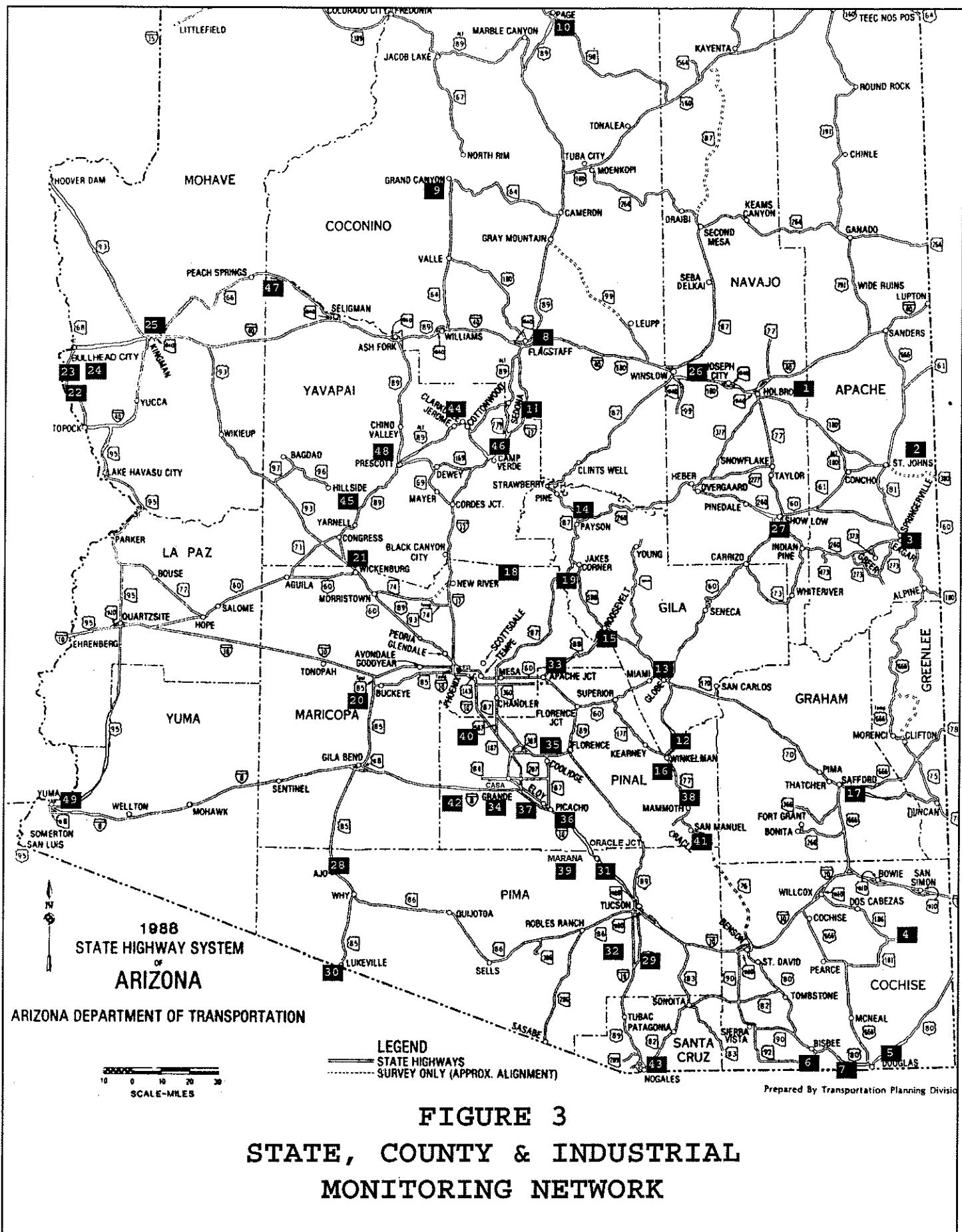


FIGURE 2
PIMA COUNTY MONITORING NETWORK

Map Key for Figure 2
Pima County Monitoring Network

Map Number	Site
1	190 W.Pennington St
2	22nd St & Craycroft Rd
3	22nd St & Alvernon Way
4	2745 N.Cherry Ave
5	1810 S.6th Ave (South Tucson)
6	1016 W.Prince Rd
7	4591 N.Pomona Rd
8	3401 W.Orange Grove Rd
9	2645 E.Broadway Blvd
10	4829 N.Sabino Canyon Rd
11	22000 S.Houghton Rd
12	12101 N.Camino de Oeste
13	11330 S.Houghton Rd
14	360 S.Church Ave
15	3905 S.Old Spanish Trail (Saguaro NM East)
16	1435 N.Fremont Ave
17	6910 S.Santa Clara Ave
18	Maint. Bldg. - Saguaro Nat'l Monument - West
*	245 W.Esperanza Blvd-Green Valley-See Fig. 3



Map Key for Figure 3

State, County and Industrial Monitoring Networks

Map Number	County	Town
1	Apache	Petrified Forest
2		St. Johns
3		Springerville
4	Cochise	Chiricahua
5		Douglas
6		Naco
7		Paul Spur
8	Coconino	Flagstaff
9		Grand Canyon
10		Page
11		Sedona
12	Gila	Hayden
13		Miami
14		Payson
15		Tonto
16		Winkelman
17	Graham	Safford
18	Maricopa	Humboldt Mtn
19		Mount Ord
20		Palo Verde
21		Wickenburg
22	Mohave	Alonas Way
23		Bullhead City
24		Fort Mohave
25		Kingman
26	Navajo	Joseph City
27		Show Low
28	Pima	Ajo
29		Green Valley
30		Organ Pipe
31		Rillito
32		Sierrita
33	Pinal	Apache Junction
34		Casa Grande
35		Coolidge
36		Eleven Mile Corner
37		Eloy
38		Mammoth
39		Marana
40		Maricopa
41		San Manuel
42		Stanfield
43	Santa Cruz	Nogales
44	Yavapai	Clarkdale
45		Hillside
46		Montezuma Castle
47		Nelson
48		Prescott
49	Yuma	Yuma

III. AIR QUALITY DATA FOR 1997

Table 2 lists the counties and towns monitored in the state and the pollutants for which data are listed.

The 1997 data summaries, which are tabulated in Tables 3 through 8, consist of the following:

- Mean concentrations for the calendar year;
- Highest concentrations for shorter time intervals;
- Number of exceedances of air quality standards; and
- Number of samples collected or hours monitored.

In the data summaries, the following abbreviations and footnotes were used:

General

NA Not Applicable
NR Not Reported

Operators

APC	Arizona Portland Cement Company
APS	Arizona Public Service Company
ASARCO	ASARCO
BHP	BHP Copper, Inc.
CMM	Cyprus Miami Mining Corporation
Maricopa	Maricopa County Environmental Svcs Department
NPS	National Park Service
Pima	Pima County Department of Environmental Quality
Pinal	Pinal County Air Quality Control District
PRAX	Praxair, Inc.
SRP	Salt River Project
SCE	Southern California Edison Company
State	Arizona Department of Environmental Quality
TEP	Tucson Electric Power Company

Equipment

Carbon Monoxide

GFC Gas filter correlation

Nitrogen Dioxide

Chem Chemiluminescent

Ozone

UV Ultraviolet absorption

PM₁₀

SA321B Sierra Andersen 321B hi-vol

SA1200 Sierra Andersen 1200 hi-vol

Wed Wedding hi-vol

Dichot Dichotomous

Imp. Improve

PM_{2.5}

Dichot Dichotomous

Imp. Improve

Sulfur Dioxide

Fluor Fluorescent

Table 2
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM10	PM _{2.5}	Sulfur Dioxide
APACHE:							
Petrified Forest	X				X	X	
St. Johns			X	X	X	X	X
Springerville		X		X	X	X	X
COCHISE:							
Chiricahua					X	X	
Douglas					X	X	
Naco					X		
Paul Spur					X	X	
COCONINO:							
Flagstaff					X	X	
Grand Canyon		X			X	X	
Page				X	X	X	
Sedona					X		
GILA:							
Hayden					X	X	X
Miami					X	X	X
Payson					X	X	
Tonto (NM)		X			X	X	
Winkelman							X
MARICOPA:							
Chandler	X				X	X	
Fountain Hills						X	

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM ₁₀	PM _{2.5}	Sulfur Dioxide
MARICOPA (Cont'd) :							
Gilbert	X			X	X		
Glendale	X			X	X		
Goodyear					X		
Higley					X		
Mesa	X			X	X		
Palo Verde			X	X	X	X	
Phoenix	X	X	X	X	X	X	
Scottsdale	X			X	X		
Tempe					X	X	
Tonto Nat'l Forest						X	
Wickenburg						X	
MOHAVE :							
Alonaz Way			X		X		X
Bullhead City					X	X	
Fort Mohave					X	X	
Kingman					X		
NAVAJO :							
Joseph City					X		
Show Low					X		
PIMA :							
Ajo					X	X	

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM ₁₀	PM _{2.5}	Sulfur Dioxide
PIMA (Cont'd):							
Green Valley					X		X
Organ Pipe					X		X
Rillito					X	X	
Saguaro National Mon.E			X				
Saguaro National Mon.W					X		
Tucson	X	X	X	X	X	X	X
PINAL:							
Apache Junction	X				X	X	
Casa Grande	X				X	X	
Coolidge					X		
Eleven Mile Corner					X		
Eloy					X		
Mammoth					X		
Marana					X		
Maricopa					X		
San Manuel						X	
Stanfield					X		
SANTA CRUZ:							
Nogales						X	X
YAVAPAI:							
Clarkdale		X				X	X
Hillside						X	X

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM ₁₀	PM _{2.5}	Sulfur Dioxide
YAVAPAI (Cont'd) :							
Montezuma Castle NM					X	X	
Nelson					X	X	
Prescott					X		
YUMA:							
Yuma				X	X	X	

Table 3
1997 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE			8-HR AVERAGE			NUMBER OF EXCEEDANCES DAY/TIMES			NUMBER OF SAMPLES
				MAX	2ND	MAX	2ND	MAX	2ND	DAY	TIMES		
MARICOPA:													
Chandler	163 S. Price	Maricopa	GFC	3.8	3.6	2.7	2.6	0	0	0	0	0	7871
Gilbert	525 N. Lindsay	Maricopa	GFC	4.6	3.7	2.2	2.1	0	0	0	0	0	8277
Glendale	6000 W. Olive	Maricopa	GFC	5.4	5.2	3.9	3.0	0	0	0	0	0	6230
Mesa	Broadway & Brooks	Maricopa	GFC	7.5	7.0	4.7	4.4	0	0	0	0	0	8118
Phoenix	4732 S. Central	Maricopa	GFC	7.3	7.1	4.5	4.4	0	0	0	0	0	7587
Phoenix	1845 E. Roosevelt	Maricopa	GFC	9.4	9.0	7.2	7.1	0	0	0	0	0	8191
Phoenix	601 E. Butler	Maricopa	GFC	8.7	7.5	4.0	3.3	0	0	0	0	0	8060
Phoenix	33315 W. Indian School	Maricopa	GFC	10.8	10.3	8.2	7.3	0	0	0	0	0	8316
Phoenix	3847 W. Earll	Maricopa	GFC	11.7	10.3	7.1	7.0	0	0	0	0	0	7597
Phoenix	4530 N. 17th Ave	State	GFC	10.0	8.6	7.7	7.6	0	0	0	0	0	3539
Phoenix	27th Ave/Grand/Thomas	State	GFC	12.6	11.7	9.5	7.7	1	1	0	0	0	3266
Phoenix	3905 N. 7th Ave	State	GFC	8.9	8.3	6.5	6.3	0	0	0	0	0	3606
Phoenix	I-10 & 27th Ave	Maricopa	GFC	9.7	8.9	7.5	6.9	0	0	0	0	0	8147
Phoenix	6180 W. Encanto	Maricopa	GFC	8.3	7.9	6.6	6.2	0	0	0	0	0	6874
Scottsdale	2857 N. Miller	Maricopa	GFC	6.3	6.1	4.1	3.9	0	0	0	0	0	7845

Table 3 (Cont'd)
1997 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE			8-HR AVERAGE			NUMBER OF EXCEEDANCES DAY			NUMBER OF SAMPLES		
				MAX	2ND	MAX	2ND	MAX	2ND	DAY	TIMES	SAMPLES			
PIMA:															
Tucson	190 W. Pennington	Pima	GFC	8.2	7.8	4.8	4.4	0	0	0	0	8658			
Tucson	22nd & Craycroft	Pima	GFC	7.2	6.9	3.4	2.6	0	0	0	0	8643			
Tucson	22nd & Alvernon	Pima	GFC	9.0	8.6	5.3	4.4	0	0	0	0	8738			
Tucson	2745 N. Cherry	Pima	GFC	6.5	5.6	4.1	3.4	0	0	0	0	8206			
PINAL:															
Apache Junction	County Courthouse	Pinal	GFC	2.2	2.0	1.6	1.0	0	0	0	0	8660			
Casa Grande	Airport N. Pinal	Pinal	GFC	1.5	1.5	1.3	1.3	0	0	0	0	8628			
STATE AND FEDERAL STANDARDS (ppm):	1-Hour Average	35		8-Hour Average	9										

- Footnotes: a. New site
 b. Site terminated
 c. Invalid annual average due to insufficient number of samples
 d. Site operated on a seasonal basis
 e. Site operated on an event basis

Table 4
1997 Lead Data (in $\mu\text{g}/\text{m}^3$)
In TSP, $\text{PM}_{1.0}$, $\text{PM}_{2.5}$

COUNTY AND CITY	SITE LOCATION	OPERATOR	IN	QUARTERLY AVERAGE				NUMBER OF SAMPLES			
				1	2	3	4	1	2	3	4
APACHE:											
Petrified Forest	1 mi. N-Park Hdgrtrs	NPS	$\text{PM}_{2.5}$	0.001	0.001	0.001	0.001	0.001	21	22	17
COCHISE:											
Douglas	City Park	State	$\text{PM}_{1.0}$	0.006	0.008	0.006	0.008	0.008	15	15	13
Chiricahua NM	Faraway Ranch	NPS	$\text{PM}_{2.5}$	0.002	0.002	0.001	0.002	0.002	24	27	26
COCONINO:											
Grand Canyon NP	Hopi Point	NPS	$\text{PM}_{2.5}$	0.001	0.001	0.000	0.001	0.001	23	27	26
Grand Canyon NP	Indian Gardens	NPS	$\text{PM}_{2.5}$	0.001	0.001	0.001	0.001	0.001	19	22	12
GILA:											
Hayden	Old Town Jail	State	$\text{PM}_{1.0}$	0.27	0.423	0.292	0.513	15	15	15	13
Tonto Nat'l Mon.	Maintenance Station	NPS	$\text{PM}_{2.5}$	0.006	0.003	0.002	0.005	0.005	25	27	26
MARICOPA:											
Palo Verde	36248 W. Elliot	State	$\text{PM}_{1.0}$	0.017	0.018	0.017	0.056	15	15	13	9
Phoenix	1845 E. Roosevelt	Maricopa	TSP	0.012	0.019	0.014	0.018	13	13	13	15
Phoenix	1826 W. McDowell	Maricopa	TSP	0.028	0.026	0.020	0.025	12	15	12	15
PIMA:											
Organ Pipe	Visitor's Center	State	$\text{PM}_{1.0}$	0.007	0.003	0.003	0.008	14	15	15	16
Tucson ^b	1016 W. Prince Rd.	Pima	TSP	.023	-	-	-	11	-	-	-

Table 4 (Cont'd)
 1997 Lead Data (in ug/m³)
 In TSP, PM₁₀, PM_{2.5}

COUNTY AND CITY	SITE LOCATION	OPERATOR	IN	QUARTERLY AVERAGE				NUMBER OF SAMPLES			
				1	2	3	4	1	2	3	4
PIIMA (Cont'd)											
Tucson ^b	22nd & Craycroft	Pima	TSP	0.011	-	-	-	15	-	-	-
SANTA CRUZ:											
Nogales	U.S. Post Office	State	PM ₁₀	0.017	0.009	0.007	0.012	12	14	13	12
YAVAPAI:											
Clarkdale	NW Cement Plant	PC	PM ₁₀	0.000	0.002	0.002	0.011	15	15	15	16
Clarkdale	SE Cement plant	PC	PM ₁₀	0.005	0.000	0.004	0.003	15	15	15	16
Clarkdale	School	State	PM ₁₀	0.003	0.001	0.003	0.024	11	9	14	14
Hillside	Sheriff Repeater Sta	State	PM ₁₀	0.002	0.001	0.001	0.001	14	13	11	9
Montezuma Castle	Maintenance Bldg	State	PM ₁₀	0.001	0.004	0.003	0.004	13	8	13	6

STATE AND FEDERAL STANDARDS (ug/m³) : Calendar Quarter Average
 1.5

- Footnotes : a. New site
 b. Site terminated
 c. Invalid annual average due to insufficient number of samples
 d. Site operated on a seasonal basis
 e. Site operated on an event basis

Table 5
1997 Nitrogen Dioxide Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	1-HR AVG	MAXIMUM	24-HR AVG	NUMBER OF SAMPLES
APACHE:								
St. Johns	Mesa Parada	SRP	Chem	8	40	21		7951
Springerville	Airport	TEP	Chem	4	38	13		7460
Springerville	4 mi.NE of town	TEP	Chem	2	55	11		7710
Springerville	1 mi.NNE of stack 1	TEP	Chem	4	79	15		7507
COCONINO:								
Page	Glen Canyon Dam	SRP	Chem	4	52	21		8555
MARICOPA:								
Palo Verde	36248 W. Elliot	State	Chem	6	70	19		3925
Phoenix	4530 N. 17th Ave.	State	Chem	62	209	201		6812
Phoenix	1845 E. Roosevelt	Maricopa	Chem	58	215	100		7172
Phoenix	I-10 & 27th Ave.	Maricopa	Chem	56	158	111		6413
Phoenix	3847 W. Earll	Maricopa	Chem	53	190	120		7505
Scottsdale	2857 N. Miller Rd.	Maricopa	Chem	N/A	154	90		1496
MOHAVE:								
Alonas Way	1285 Alonas Way	SCE	Chem	18	103	47		8710

Table 5 (Cont'd)
1997 Nitrogen Dioxide Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL		MAXIMUM	NUMBER OF SAMPLES
				AVERAGE	1-HR AVG		
PIMA:							
Tucson	22nd & Craycroft	Pima	Chem	3.4	130	64	8671

STATE AND FEDERAL STANDARDS (ug/m³) : Annual Average
100

- Footnotes: a. New site
 b. Site terminated
 c. Invalid annual average due to insufficient number of samples
 d. Site operated on a seasonal basis
 e. Site operated on an event basis

Table 6
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	1-HR AVG	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
MAX	2ND HI					
APACHE:						
St. Johns	Mesa Parada	SRP	.07	.06	0	.057
COCHISE:						
Chiricahua NM	Faraway Ranch	NPS	.07	.07	0	.065
COCONINO:						
Grand Canyon	2 mi. W. Hopi Point	NPS	.08	.07	0	.073
Page	Glen Canyon Dam	SRP	.07	.07	0	.063
GILA:						
Rye ^{abd}	RV Center	State	.08	.07	0	.057
MARICOPA:						
Blue Point	Sheriff's Station	Maricopa	.10	.10	0	.084
Chandler	163 S. Price	Maricopa	.10	.10	0	.078
Fountain Hills	16426 E. Palisades	Maricopa	.11	.11	0	.089
Glendale-Arrowhead	6801 W. Deer Valley	Maricopa	.07	.07	0	.061
Glendale	6000 W. Olive	Maricopa	.10	.09	0	.077
Humbolt Mountain	USFS Building	Maricopa	.10	.10	0	.082
Mesa	4530 E McKellips Rd	Maricopa	.10	.10	0	.082
Mesa	Broadway & Brooks	Maricopa	.11	.10	0	.083
Mount Ord	USFS Building	Maricopa	.11	.11	0	.085

Table 6 (Cont'd)
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	MAX	2ND HI	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
MARICOPA (Cont'd) :							
Palo Verde ^d	36248 W. Elliot	State	.10	.09	0	.078	5704
Phoenix	2035 N. 52nd Street	Maricopa	.11	.11	0	.086	8369
Phoenix	1845 E. Roosevelt	Maricopa	.11	.10	0	.078	8208
Phoenix	601 E. Bulter	Maricopa	.11	.11	0	.092	8174
Phoenix	3847 W. Earll	Maricopa	.10	.10	0	.092	7516
Phoenix	4732 S. Central	Maricopa	.10	.10	0	.075	8066
Phoenix ^d	4530 N. 17th Ave.	State	.10	.10	0	.080	5741
Phoenix	6180 W. Encanto	Maricopa	.10	.10	0	.078	6919
Pinnacle Peak	25000 N. Windy Walk	Maricopa	.11	.11	0	.083	8418
Rio Verde	Forest Rd & Rio Verde Dr	Maricopa	.11	.10	0	.086	3460
Roosevelt Lake	Visitor's Center	Maricopa	.11	.10	0	.088	3309
Scottsdale	2857 N. Miller Rd	Maricopa	.10	.10	0	.077	7875
Scottsdale ^d	10005 E. Osborn	State	.11	.10	0	.083	5790
PIMA:							
Saguaro NM E	3905 S.Old Spanish Tr	Pima	.10	.09	0	.080	8489
Tucson	190 W. Pennington	Pima	.08	.08	0	.065	8602

Table 6 (Cont'd)
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	MAX.	1-HR AVG	2ND HI	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
PIMA (Cont'd) :								
Tucson	22nd & Craycroft	Pima	.11	.10	0	0	.077	8690
Tucson	11330 S. Houghton	Pima	.08	.08	0	0	.066	8688
Tucson ^a	400 W. Power Road	Pima	.09	.09	0	0	.065	3368
Tucson	12101 N.Camino deOeste	Pima	.08	.08	0	0	.070	8676
PINAL:								
Apache Junction	County Courthouse	Pinal	.11	.10	0	0	.082	8665
Casa Grande	Airport - N. Pinal	Pinal	.08	.08	0	0	.072	8655
YAVAPAI:								
Hillside ^d	Sheriffs Repeater St	State	.09	.08	0	0	.078	4230
YUMA:								
Yuma ^d	1485 Second Ave.	State	.10	.10	0	0	.078	5559
STATE AND FEDERAL STANDARDS (ppm) : Maximum Daily 1-HR Average Maximum Daily 8-HR Average								
Old							0.12	
New							0 .08	

- Footnotes: a. New site
 b. Site terminated
 c. Invalid annual average due to insufficient number of samples
 d. Site operated on a seasonal basis
 e. Site operated on an event basis

Table 7
1997 PM₁₀ Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE		24-HOUR AVERAGE		NUMBER OF EXCEEDANCES 24-HR STD		NUMBER OF SAMPLES
				MAX	2ND HIGH	MAX	2ND HIGH	24-HR STD		
APACHE:										
Petrified Forest	1 mi from Vis.Ctr	NPS	Improve	9	43	30	0	0	80	
St. Johns	Mesa Parada	SRP	Dichot	7	18	18	0	0	58	
St. Johns	Carriizo Draw	SRP	Dichot	8	32	18	0	0	61	
Springerville	Coyote Hills	TEP	Dichot	8	22	19	0	0	120	
Springerville	Plant Site	TEP	Dichot	10	34	33	0	0	116	
COCHISE:										
Chiricahua NM	Faraway Ranch	NPS	Improve	9	35	22	0	0	100	
Douglas	High School	State	Dichot	26	55	55	0	0	56	
Naco	Port of Entry	State	SA1200	33	113	47	0	0	55	
Paul Spur	Housing area	State	Dichot	39	77	74	0	0	49	
COCONINO:										
Flagstaff	5701 E.Railroad	State	Wedd'g	15	40	39	0	0	61	
Flagstaff	Middle School	State	Dichot	15	32	32	0	0	60	
Grand Canyon	Hopi Point	NPS	Improve	8	31	31	0	0	96	
Grand Canyon	Indian Gardens	NPS	Improve	14	82	58	0	0	80	
Sedona	Post Office	State	SA322	11	24	23	0	0	44	
GILA:										
Hayden	Old Town Jail	State	Dichot	36	158	67	1	1	58	
Miami	Golf Course	CMMC	Dichot	27	67	62	0	0	61	

Table 7 (Cont'd)
1997 PM₁₀ Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX	2ND HIGH	24-HOUR AVERAGE	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
GILA (Cont'd) :									
Miami	Ridgeline	CMMC	Dichot	14	33	29	0	0	59
Miami ^b	Barcon Bldg US60	State	TEOM	50	161	154	1	1	7663
Payson	US West Bldg	State	Dichot	25	81	67	0	0	59
Tonto	Maint. stat.	NPS	Improve	12	42	28	0	0	98
GRAHAM:									
Safford ^c	523 Tenth Ave.	State	SA1200	29	95	62	0	0	45
MARICOPA:									
Chandler	1475 E Pecos Rd.	Maricopa	SA1200	61	221	148	1	1	57
Chandler W.	163 S. Price Rd.	Maricopa	SA1200	45	194	162	2	2	57
Gilbert	535 N. Lindsay Road	Maricopa	SA1200	49	170	108	1	1	55
Glendale	6000 W. Olive	Maricopa	SA321B	38	170	87	1	1	57
Goodyear/Estrella	15099 W. Casey Abbott	State	Dichot	35	179	146	1	1	50
Higley	15500 S. Higley	State	Dichot	64	288	234	2	2	56
Maryvale	6180 W. Encanto	Maricopa	SA1200	49	345	161	2	2	61
Mesa	Broadway & Brooks	Maricopa	SA1200	43	129	119	0	0	59
Palo Verde	36248 W. Elliot Rd.	State	Dichot	20	124	73	0	0	52
Phoenix	4732 S. Central	Maricopa	SA321B	55	160	114	1	1	61
Phoenix	3847 W. Earll	Maricopa	SA321B	51	224	137	1	1	60

Table 7 (Cont'd)
1997 PM₁₀ Data (in ug/m³)

COUNTRY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR MAX	2ND HIGH	24-HR STD	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
MARICOPA (Cont'd) :									
Phoenix	1845 E. Roosevelt	Maricopa	BA321B	44	108	96	0	55	
Phoenix	601 E Butler	Maricopa	SA321B	38	152	81	0	51	
Phoenix	4530 N. 17th Ave.	State	Dichot	39	131	82	0	57	
Phoenix	4530 N. 17th Ave.	State	TEOM	36	147	143	0	7328	
Phoenix	27th Ave./I-10	State	Dichot	49	148	103	0	53	
Phoenix	27th Ave./I-10	State	TEOM	45	161	113	1	7792	
Phoenix	27th Ave./I-10	Maricopa	SA1200	61	220	125	1	56	
Phoenix	4701 W. Thunderbird	State	Dichot	34	164	92	1	55	
Scottsdale	2857 N. Miller Rd.	Maricopa	SA321B	41	154	84	0	60	
Tempe	3340 S. Rural	State	Dichot	36	90	74	0	56	
Wickenburg	155 N. Tegner St.	Maricopa	SA321B	32	125	65	0	48	
MOHAVE:									
Alona's Way	1285 Alona's Way	SCE	SA321B	21	51	43	0	57	
Bullhead City ^b	224 N. Main	State	TEOM	26	139	85	0	7104	
Bullhead City ^c	990 Hwy 95	State	Dichot	15	30	22	0	10	
Fort Mohave	Fort Mohave	State	Dichot	15	68	44	0	57	
Kingman	I-40/Griffith Rd	Praxair	SA1200	12	34	32	0	111	
NAVAJO:									
Joseph City	Third & Tanner	APS	Wedd'g	15	35	21	0	61	

Table 7 (Cont'd)
1997 PM₁₀ Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
NAVAJO (Cont'd) :	Show Low ^c	Deuce of Clubs Ave.	State	Wedd'g	16	127	35
PIMA:							
Ajo	Well Road	State	Dichot	20	65	50	0
Corona de Tucson	22000 S. Houghton	Pima	SA1200	15	34	31	0
Green Valley	245 W. Esperanza	Pima	SA1200	16	42	30	0
Organ Pipe NM	Visitors Center	State	Dichot	10	75	29	0
Rillito	8820 W. Water	State	Dichot	40	129	128	0
Rillito	8820 W. Water	APCC	Wedd'g	26	77	67	0
Tucson	2645 E. Broadway	Pima	SA1200	28	58	57	0
Tucson	6910 S. Santa Clara	Pima	SA1200	27	64	46	0
Tucson	360 S. Church	Pima	SA1200	29	72	71	0
Tucson	3401 W. Orange Grove	Sta./Pima	Dichot	31	68	66	0
Tucson	1016 W. Prince Rd	Pima	SA1200	34	62	58	0
Tucson	1810 S. 6th Ave	Pima	SA1200	33	72	69	0
Tucson	22nd/Craycroft	Sta./Pima	Dichot	26	63	56	0
Tucson	12101N.Camino de Oeste	Sta./Pima	Dichot	15	40	31	0
Tucson	11330 S.Houghton Rd.	Sta./Pima	Dichot	16	41	33	0
Tucson	1435 N Fremont	Sta./Pima	Dichot	27	58	53	0
Tucson	4829 N.Sabino Canyon	Pima	Wedd'g	17	36	35	0

Table 7 (Cont'd)
1997 PM₁₀ Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE		24-HR STD	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
					MAX	2ND HIGH			
PINAL:									
Apache Junction	South City Courthouse	Pinal	Wedd'g	25	81	58	0	0	61
Apache Junction	North City Courthouse	Pinal	Wedd'g	28	81	57	0	0	60
Casa Grande ^f	401 Marshall Rd.	Pinal	Wedd'g	35	188	76	1	1	60
Coolidge ^f	County Highway Yard	Pinal	Wedd'g	41	156	102	1	1	61
Eleven Mile Crn. ^f	Rodeo Grounds	Pinal	SA321B	62	407	230	2	2	58
Eloy ^f	Eloy Fire Department	Pinal	SA321B	44	348	82	1	1	55
Mammoth	County Courthouse	Pinal	SA1200	22	46	46	0	0	57
Marana	Pinal Air Park	Pinal	SA1200	26	65	62	0	0	60
Maricopa ^f	Edwards Residence	Pinal	SA321B	73	855	685	2	2	59
Stanfield ^f	County Courthouse	Pinal	Wedd'g	53	608	157	2	2	60
SANTA CRUZ:									
Nogales	U.S. Post Office	State	Dichot	31	126	93	0	0	51
YAVAPAI:									
Clarkdale	SEOfCTI Flyash Silo	PC	Dichot	24	50	45	0	0	61
Clarkdale	Clarkdale School	State	Dichot	15	33	27	0	0	48
Clarkdale	NW of Cement Plant	PC	Dichot	24	63	62	0	0	61
Hillside	Sheriff Repeater St.	State	Dichot	12	85	38	0	0	47
Montezuma Castle ^c	Maintenance Bldg	State	Dichot	12	31	22	0	0	42

Table 7 (Cont'd)
1997 PM₁₀ Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
YAVAPAI (Cont'd:)							
Nelson	Chemstar Lime Plant	State	Dichot	14	53	40	0
Prescott	City Admin. Bldg	State	Wedd'g	14	38	33	0
YUMA:							
Yuma ^c	2795 Avenue B	State	Dichot	36	108	83	0
							34

STATE & FEDERAL STANDARDS (ug/m³) : Annual Average
 Old 50 24-Hour
 New 50 150 (Not to be exceeded more than once per year)
 150 (Not to be exceeded by the 99th percentile)

See Table 1 for details on the standards.

Footnotes :

- a. New site
- b. Site terminated
- c. Invalid annual average due to insufficient number of samples
- d. Site operated on a seasonal basis
- e. Site operated on an event basis
- f. PM₁₀ exceedances identified by Pinal County to have been caused by high winds. Additional information can be found in the Natural Events Action Plan as adopted on December 3, 1997 by the Pinal County Board of Supervisors under Resolution No.12397-AQC.

Table 8
1997 PM_{2.5} Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98TH PERCENT FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
APACHE:						
Petrified Forest	1 mi from Vis.Ctr	NPS	Improve	4	11	82
St. Johns	Mesa Parada	SRP	Dichot	4	7	58
St. Johns	Carriizo Draw	SRP	Dichot	4	7	61
Springerville	Coyote Hills	TEP	Dichot	4	8	121
Springerville	Plant Site	TEP	Dichot	4	8	116
COCHISE:						
Chiricahua NM	Faraway Ranch	NPS	Improve	5	12	100
Douglas	High School	State	Dichot	6	11	56
Paul Spur	Housing area	State	Dichot	9	25	49
COCONINO:						
Flagstaff	Middle School	State	Dichot	5	15	60
Grand Canyon	Hopi Point	NPS	Improve	3	16	95
Grand Canyon	Indian Gardens	NPS	Improve	5	21	55
GILA:						
Hayden	Old Town Jail	State	Dichot	9	17	58
Miami	Golf Course	CMMC	Dichot	8	14	61
Miami	Ridgeline	CMMC	Dichot	6	8	59
Payson	US West Bldg	State	Dichot	12	51	59
Tonto	Maintenance Stat.	NPS	Improve	5	10	102

Table 8 (Cont'd)
1997 PM_{2.5} Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98TH PERCENT FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
MARICOPA:						
Higley	15500 S. Higley	State	Dichot	10	23	56
Goodyear/Estrella	15099 W. Casey Abbott	State	Dichot	8	21	50
Palo Verde	36248 W. Elliot	State	Dichot	5	11	52
Phoenix	4530 N. 17th Ave.	State	Dichot	12	32	57
Phoenix	4701 W. Thunderbird	State	Dichot	9	20	55
Tempe	3340 S. Rural	State	Dichot	10	26	56
Tonto Nat'l Forest	Mount Ord	State	Improve	4	8	88
MOHAVE:						
Fort Mohave	Fort Mohave	State	Dichot	4	10	57
PIMA:						
Ajo	Well Road	State	Dichot	5	11	49
Organ Pipe NM	Visitors Center	State	Dichot	4	13	59
Rillito	8820 W. Water	State	Dichot	6	27	58
Saguaro Nat'l Mon	West Unit	State	Improve	5	11	86
Tucson	3401 W. Orange Grove	Sta/Pima	Dichot	9	21	61
Tucson	22nd/Craycroft	Sta/Pima	Dichot	7	12	61
Tucson	12101N. Camino deOeste	Sta/Pima	Dichot	5	10	61
Tucson	11330 S. Houghton Rd.	Sta/Pima	Dichot	6	9	61
Tucson	1435 N Fremont	Sta/Pima	Dichot	8	17	61

Table 8 (Cont'd)
 1997 PM_{2.5} Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98TH PERCENTILE FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
SANTA CRUZ:						
Nogales	U.S. Post Office	State	Dichot	13	43	51
YAVAPAI:						
Clarkdale	SEofCTI Flyash Silo	PC	Dichot	5	25	61
Clarkdale	Clarkdale School	State	Dichot	4	9	48
Clarkdale	NW of Cement Plant	PC	Dichot	5	14	61
Hillside	Sheriff Repeater St.	State	Dichot	3	10	47
Montezuma Castle ^c	Maintenance Bldg	State	Dichot	4	9	42
Nelson	Chemstar Lime Plant	State	Dichot	5	15	55
YUMA:						
Yuma ^c	2795 Avenue B	State	Dichot	6	16	34

STATE & FEDERAL STANDARDS (ug/m³): Annual Average 24-Hour
 See Table 1 for details on the standards. 15 65 (Not to be exceeded by the 98th percentile)

Footnotes:

- a. New site
- b. Site terminated
- c. Invalid annual average due to insufficient number of samples
- d. Site operated on a seasonal basis
- e. Site operated on an event basis

Table 9
1997 Sulfur Dioxide Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL			MAXIMUM			NUMBER OF EXCEEDANCES			NUM-OF-SAMPLES
				AVERAGE	3-HR AVG	24-HR AVG	3-HR STD	24-HR STD	24-HR STD				
APACHE:													
St. Johns	Mesa Parada	SRP	Fluor	8	41	23	0	0	0	0	0	0	7982
Springerville	4 mi. NE of town	TEP	Fluor	<1	55	13	0	0	0	0	0	0	7793
Springerville	Airport	TEP	Fluor	<1	37	8	0	0	0	0	0	0	7842
Springerville	1 mi NNE-unit 1	TEP	Fluor	3	160	34	0	0	0	0	0	0	6293
COCONINO:													
Page	Glen Canyon Dam	SRP	Fluor	5	125	36	0	0	0	0	0	0	8559
GILA:													
Hayden	Garfield Ave.	ASARCO	Fluor	22	521	283	0	0	0	0	0	0	8427
Hayden	Jail	ASARCO	Fluor	15	584	127	0	0	0	0	0	0	8401
Hayden	Hayden Jct	ASARCO	Fluor	12	285	47	0	0	0	0	0	0	8389
Hayden	Montgomery Ranch	ASARCO	Fluor	40	645	239	0	0	0	0	0	0	8199
Hayden	Jail	State	Fluor	5	697	152	0	0	0	0	0	0	8456
Miami	Ridgeline-Linden	State	Fluor	5	524	92	0	0	0	0	0	0	8347
Miami	Jones Ranch	CMMC	Fluor	10	820	138	0	0	0	0	0	0	8750
Miami	Town Site	CMMC	Fluor	3	417	57	0	0	0	0	0	0	8748
Winklemann	1 mi.N Jct. 77/177	ASARCO	Fluor	43	836	315	0	0	0	0	0	0	8227
MARICOPA:													
Phoenix	I-10 & 27th Ave	Maricopa	Fluor	5	49	26	0	0	0	0	0	0	5441
Phoenix	3847 W. Earll	Maricopa	Fluor	3	21	16	0	0	0	0	0	0	5794

Table 9 (Cont'd)
1997 Sulfur Dioxide Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM	NUMBER OF EXCEEDANCES	NUM-OF-SAMPLES
				3-HR AVG	24-HR AVG	3-HR STD	24-HR STD
MARICOPA (Cont'd) :							
Phoenix	1845 E. Roosevelt	Maricopa	Fluor	11	71	0	0
Scottsdale	2857 N. Miller Rd	Maricopa	Fluor	8	24	0	0
MOHAVE:							
Alonias Way	1285 Alonias Way	SCE	Fluor	5	144	28	0
PIMA:							
Sierrrita	7515W. Magee Ranch Rd	State	Fluor	3	440	55	0
Tucson	22nd & Craycroft	Pima	Fluor	5	39	13	0
PINAL:							
San Manuel ^a	Townsite	BHP	Fluor	33	374	95	0
San Manuel ^b	Golf Course	BHP	Fluor	8	197	48	0
San Manuel	Dorm Site	BHP	Fluor	11	220	75	0
San Manuel	IDS Church	State	Fluor	8	291	60	0
San Manuel	Hospital	BHP	Fluor	32	705	208	0
STANDARDS:							
State (ug/m ³)		24-Hour Average			Annual Average		
Federal (ppm)		1300	365	0.5	80	0.14	0.03

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis

IV. AIR QUALITY TRENDS

A. CARBON MONOXIDE

From 1989 through 1993 CO concentrations in Phoenix declined gradually at both trend sites, the microscale site, Indian School Road, and Roosevelt Street, the neighborhood scale site (See Figure 4). In 1994 and 1995, however, concentrations increased at these two sites, and then declined in 1996 and 1997. In Tucson, a similar trend is apparent except that concentrations decreased more steeply in 1991-1993. The trend site selected for Tucson, Alvernon Way, is a microscale site. This 10-year trend is also evident in the graph of exceedances of the 8-hour standard, 9 ppm, in Figure 5. Variations from year to year were most likely due to changes in meteorology. However, the 10-year trend suggests a reduction in CO emissions due to cleaner vehicles.

B. LEAD

Lead concentrations during the past ten years were well below the quarterly standard, 1.5 ug/m³, in both major urban areas (See Figure 5). This is the result of major reductions in lead emissions from vehicles, starting in the mid-1970's due to the use of non-leaded gasoline.

C. NITROGEN DIOXIDE

Concentrations have remained far below the annual standard, 100 ug/m³, in both Phoenix and Tucson in the last ten years. In Phoenix annual averages have been in the 25-50 ug/m³ range compared with 30-40 ug/m³ in Tucson. Since valid data for Phoenix is limited to recent years at a few sites, no trend graph was plotted.

D. OZONE

The plot of 1-hour ozone concentrations in Figure 7 does not show any clear, long-term pattern. Thus, it appears that there is no significant change in the highest 1-hour values for Phoenix, Tucson, and Yuma.

Exceedances of the 1-hour standard, 0.12 ppm, follow a different pattern in Phoenix(See Figure 8). The number of exceedances varied substantially from year to year due to changes in meteorology. This was especially apparent in 1995-1997. Another significant factor affecting the trend data is the expansion of the monitoring network. Maricopa County has installed several

new sites in the past 3-4 years in the eastern part of the Valley where higher ozone concentrations occur.

In Tucson, Yuma, and Pinal County, no exceedances of the 1-hour standard have been monitored.

E. PM₁₀

For the Phoenix metropolitan area, no major variation in PM₁₀ levels is apparent over the past six years (see Table 9). There are fluctuations in the annual averages from year to year, probably due to changes in meteorology or land use near the sites. Chandler remains the only trend site exceeding the annual and 24-hour standards in the area. It should be noted that there are other sites in the Phoenix urban area which exceed the annual and 24-hour standards, but data is limited to a few years. These sites include Phoenix-Maryvale, Phoenix-Greenwood, Phoenix-Salt River, and Higley.

In the Tucson urban area, PM₁₀ concentrations have not changed appreciably in the last six years (See Table 9) with one exception. At the Prince Road site a significant increase in concentrations occurred in 1995. Nevertheless, no exceedances of the annual or 24-hour standards have been monitored in Tucson during the past nine years.

In other areas of Arizona, annual PM₁₀ levels have not varied substantially over the past six years except in Douglas, Naco, Nogales, Payson, and Paul Spur (see Table 10). In Douglas, Nogales, and Payson annual averages have decreased steadily during this period. In Nogales the annual average steadily declined, from 54 ug/m³ in 1992 to 31 ug/m³ in 1997. As a result, Nogales was in compliance with the annual standard in 1993.

At Naco and Paul Spur concentrations have changed in somewhat different manners. At Naco the PM₁₀ average level declined significantly in 1996 to 32 ug/m³, whereas at Paul Spur, a substantial decrease occurred in 1993. As a result, Paul Spur has achieved and maintained compliance with the annual and 24-hour standards.

F. SULFUR DIOXIDE

In 1989 nine exceedances of the 3-hour standard were monitored in Hayden and San Manuel (see Figure 9). Subsequently, the maximum number of 3-hour exceedances in any of the three Arizona smelter

towns has been one per year. Thus, the smelter towns have been in compliance with air quality standards from 1990 through 1997 since one exceedance per year is allowed. The number of 3-hour exceedances is plotted as the trend indicator because this is the most restrictive standard for sulfur dioxide. Miami has the best record among the three smelter towns with no exceedances since 1987.

FIGURE 4

CARBON MONOXIDE CONCENTRATIONS IN PHOENIX AND TUCSON

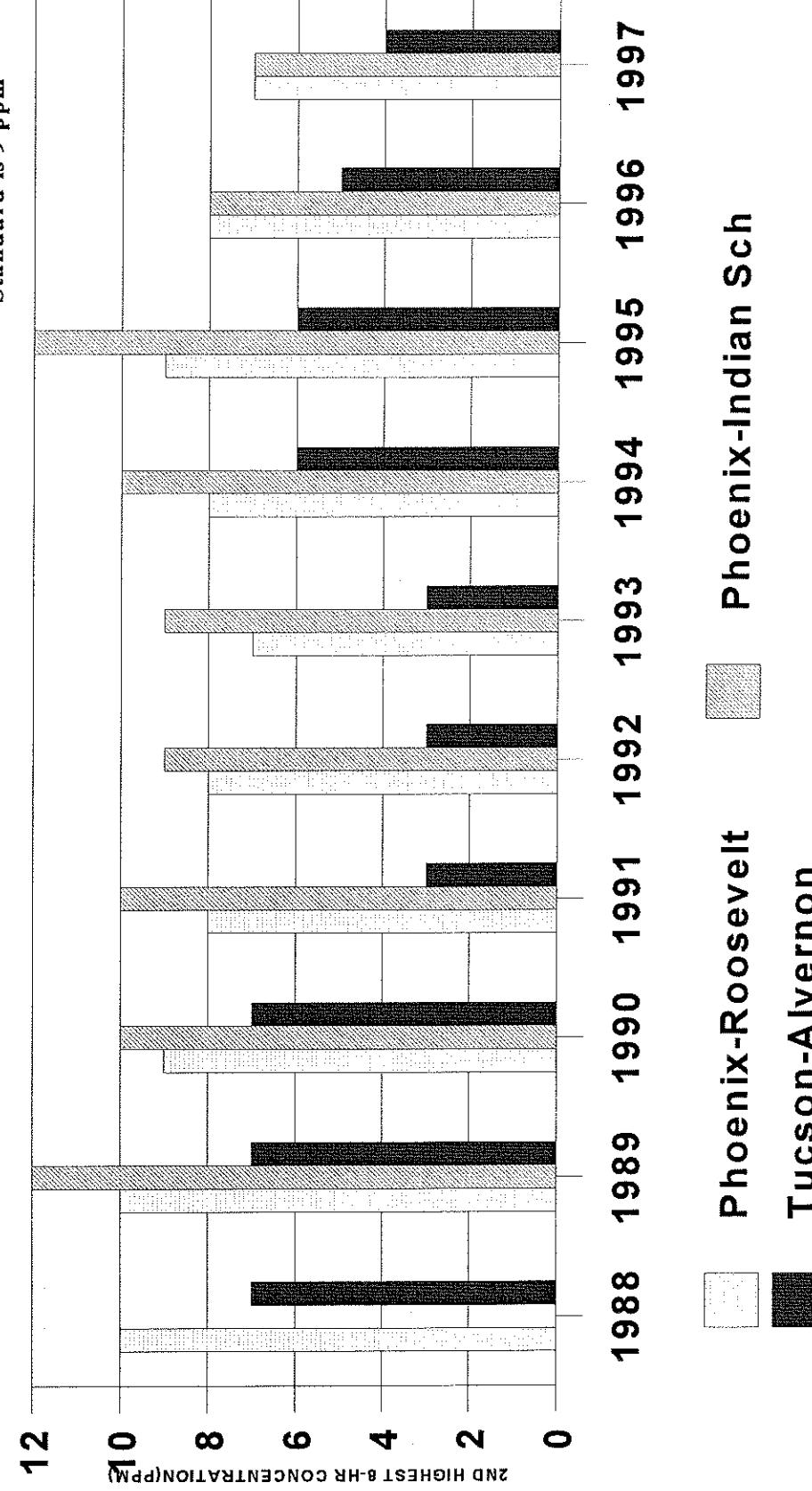


FIGURE 5

CARBON MONOXIDE EXCEEDANCES IN PHOENIX AND TUCSON

Standard is 9 ppm

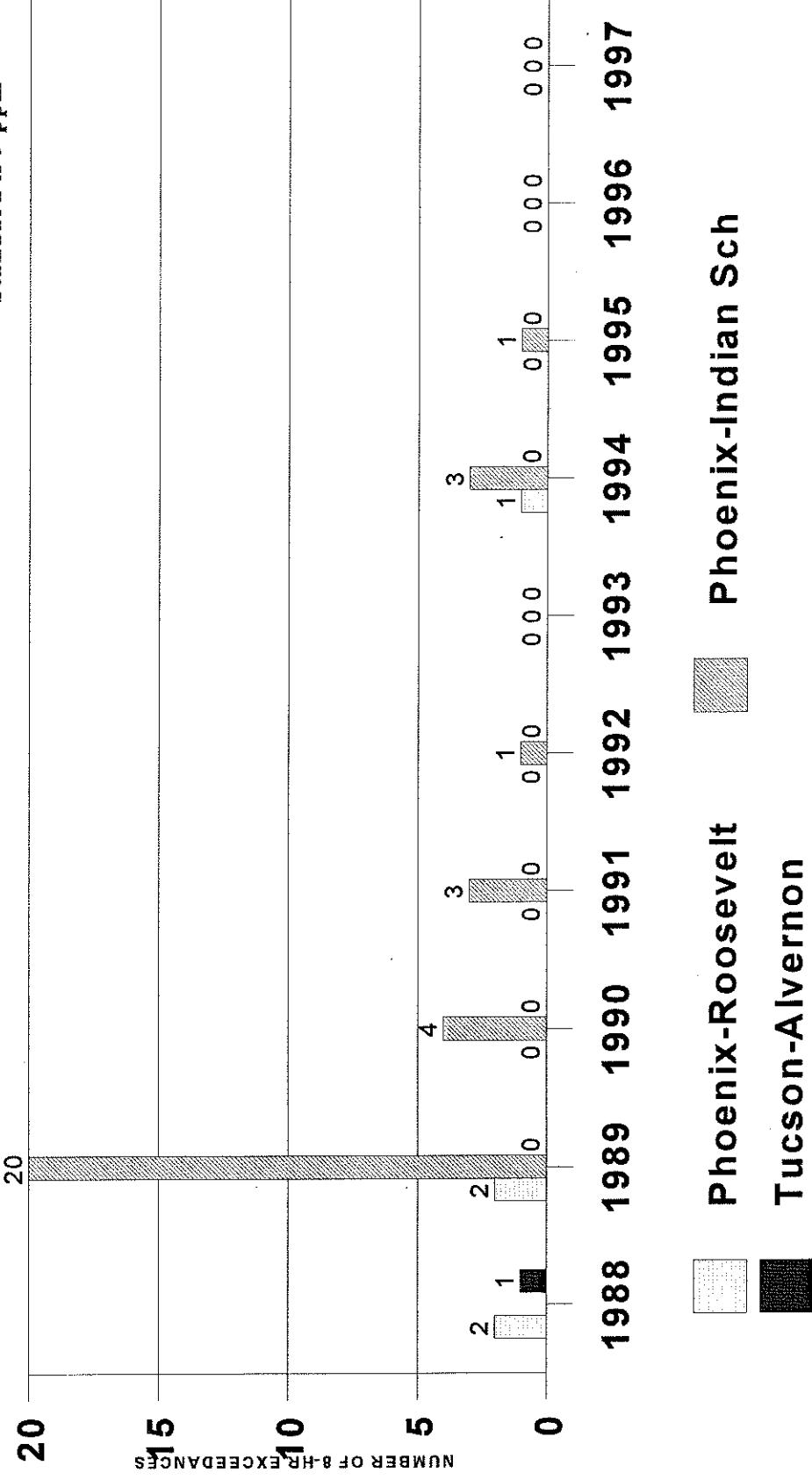


FIGURE 6

LEAD CONCENTRATIONS IN PHOENIX AND TUCSON

Standard is 1.5 ug/m³

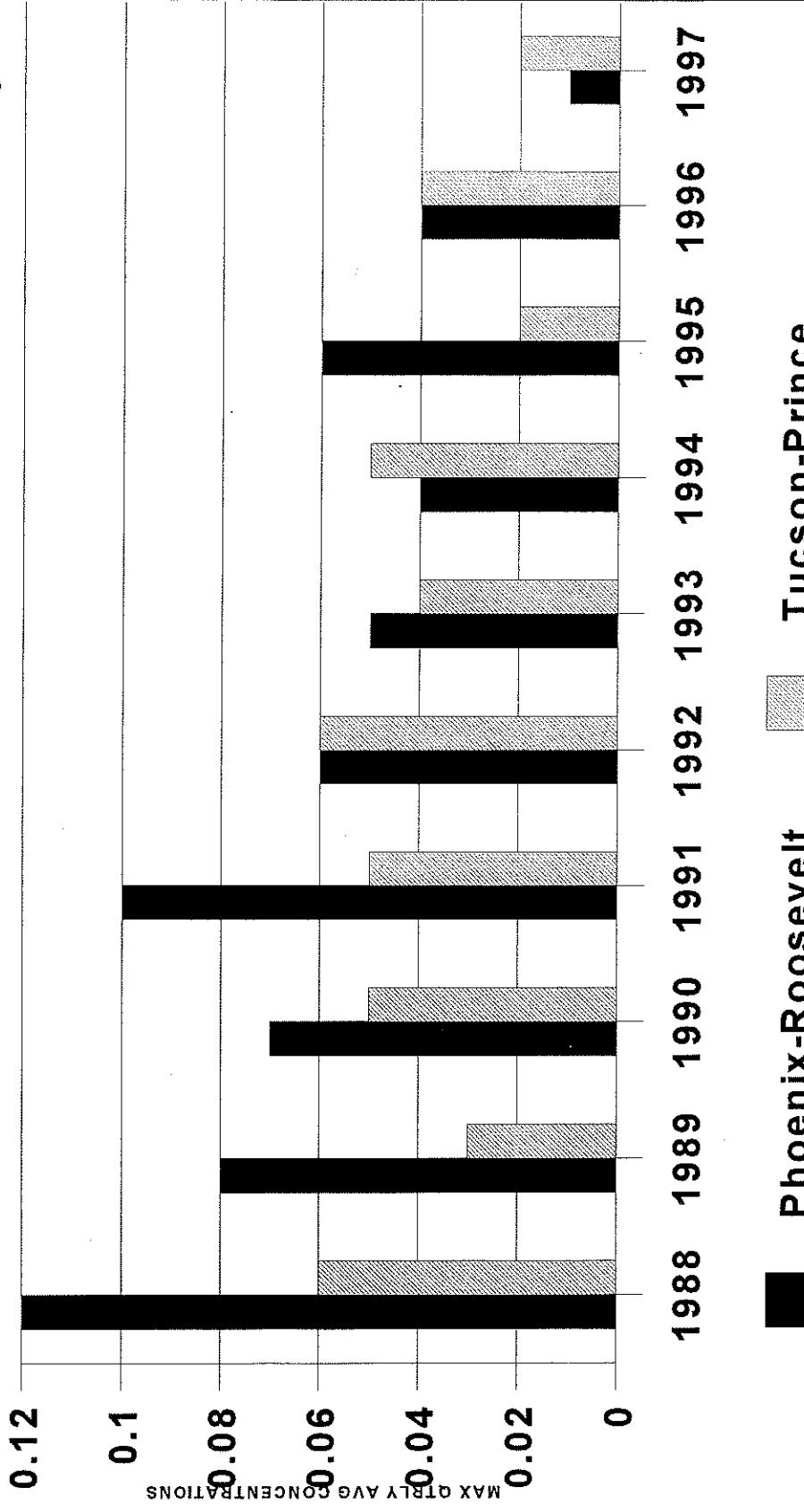


FIGURE 7

OZONE CONCENTRATIONS IN PHOENIX, TUCSON AND YUMA

Standard is 0.12 ppm

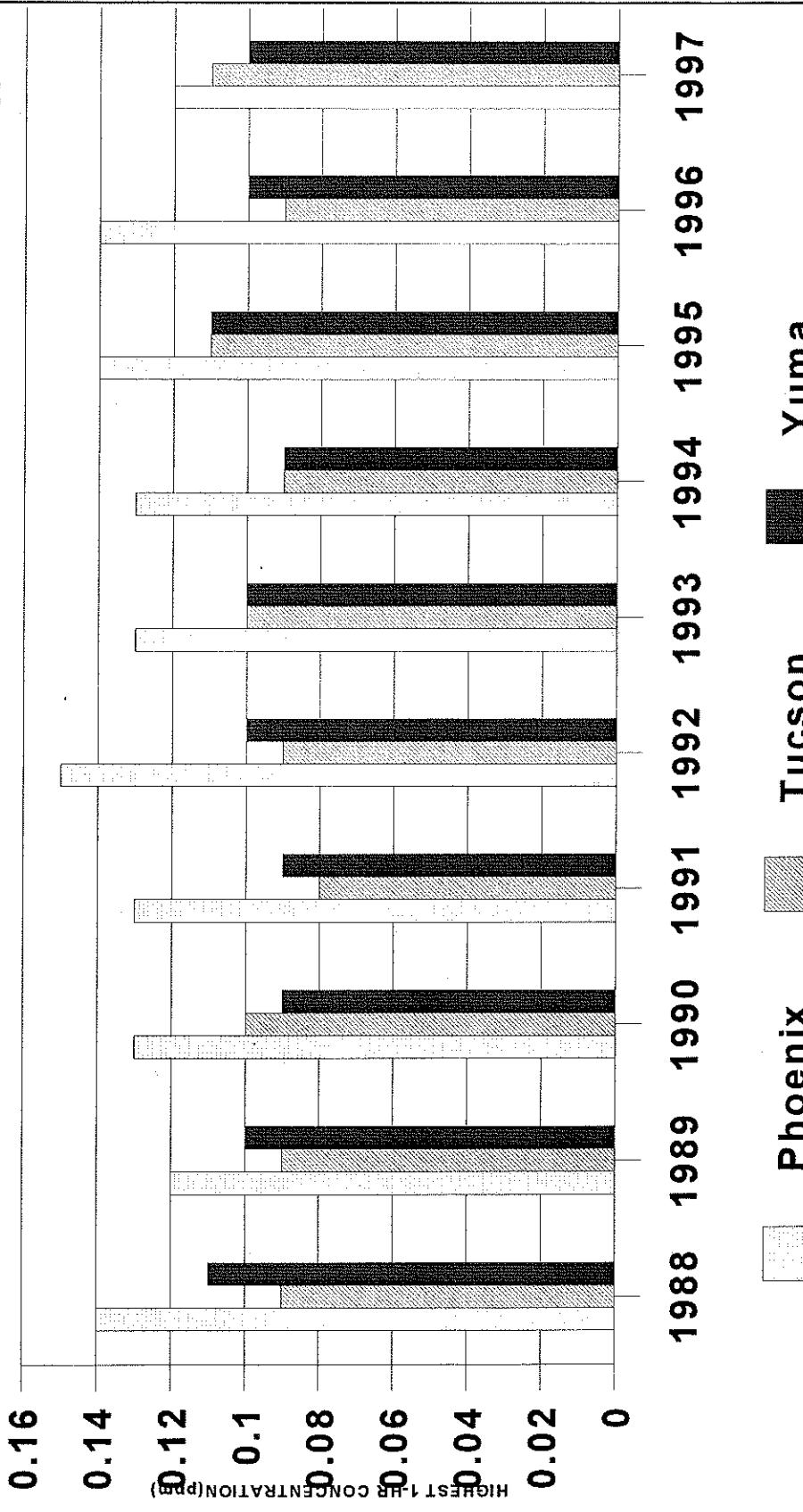


FIGURE 8

**OZONE EXCEEDANCES
IN PHOENIX AREA**

Standard is 0.12 ppm

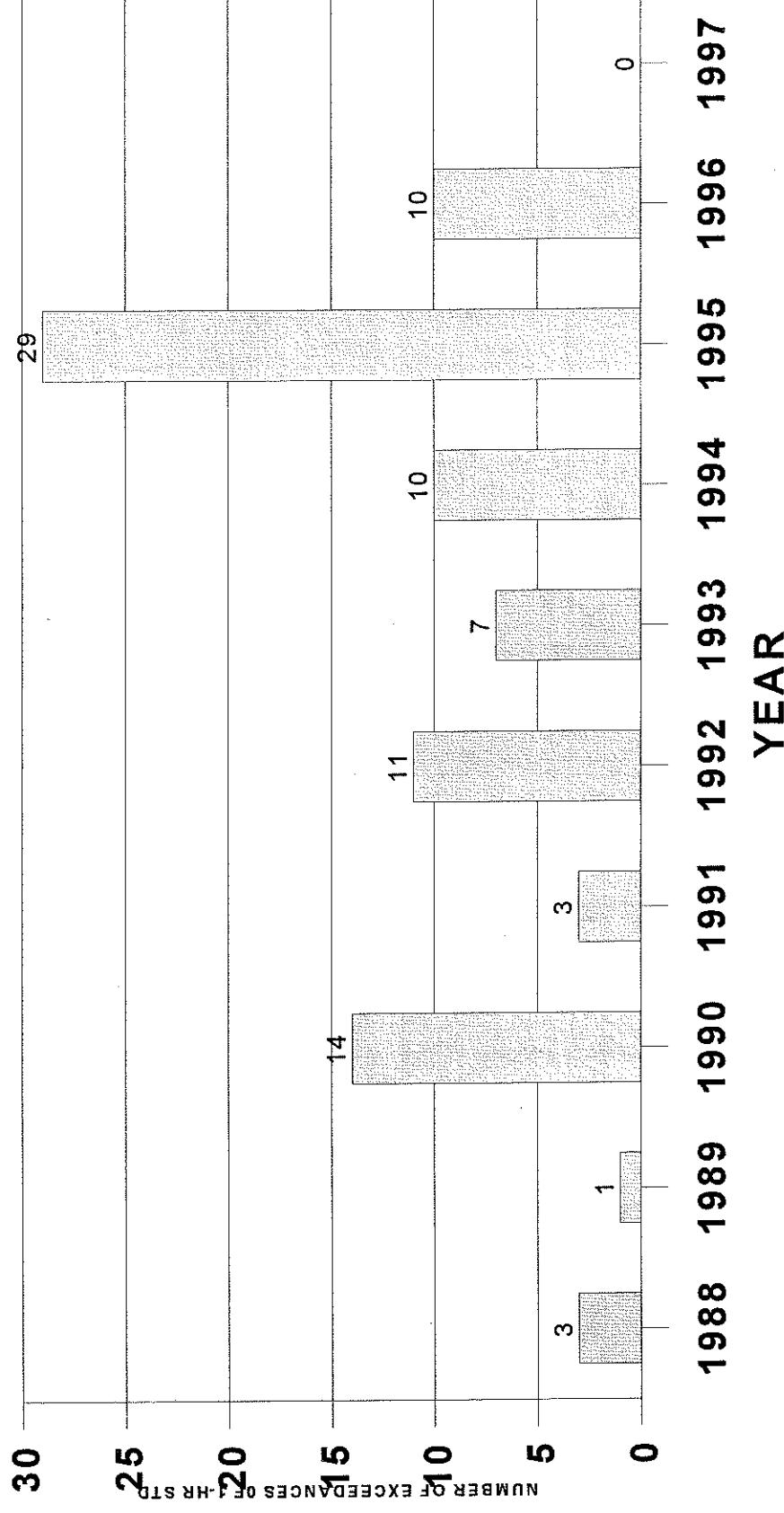


Table 10
 PM_{10} Concentrations in Phoenix and Tucson Urban Areas
 Annual Average ($\mu\text{g}/\text{m}^3$)

PHOENIX URBAN AREA						
SITE	1992	1993	1994	1995	1996	1997
Central Phoenix	42 ^a	43 ^a	43	44	41	44
Chandler	56 ^a	58 ^a	50	53	62	61
Glendale	34 ^a	35	33	33	34	38
North Phoenix	35 ^a	34	35	36	37	38
South Phoenix	48	44	44	46	47	55
West Phoenix	47 ^a	44	43	44	45	51
Mesa	29 ^a	35	36 ^a	35	33	43
South Scottsdale	34	34 ^a	38	36	35	41

TUCSON URBAN AREA						
SITE	1992	1993	1994	1995	1996	1997
South Tucson	32	32	27	31	31	33
Prince Road	28	24	25	38	36	34
Corona de Tucson	12	12	13	15	13	15
Green Valley	15	16	16	16	15	16
Orange Grove	30	28	31	34	32	31
Broadway/Swan	36 ^a	25	26	28	25	28

a. Invalid annual average due to insufficient number of samples

Annual standard - 50 $\mu\text{g}/\text{m}^3$ for a 3-year running average

Table 11
PM₁₀ Concentrations in Various Cities
Annual Average (µg/m³)

SITE	1992	1993	1994	1995	1996	1997
Ajo	23	23 ^a	19 ^a	24	21	20
Apache Junction	22	21	22	26	20	25
Bullhead City	30	31	34	36	35	15 ^{abc}
Casa Grande	30	31	27	29	30	35
Clarkdale	16 ^{abc}	16	17	17	16	15
Douglas	40	29	34	32	32 ^b	26
Flagstaff	24 ^{bc}	22 ^a	19	21	-- ^d	15
Hayden	35	27	26	34	41	36
Joseph City	17	16	15	16 ^a	14	15
Montezuma Castle	16	12	11	13	13	12 ^a
Naco	64 ^{ab}	48	39 ^a	45	32	33
Nelson	-	20	19	18	22	14
Nogales	54	42	39	43	42	31
Organ Pipe	11	10	9	9	11	10
Paul Spur	62	40	34	33	36	39
Payson	40	32	30	39	30	25
Prescott	19	17	15	14	14	14
Rillito	33	28	28	35	39	40
Safford	32	26	26	33	40	29
Show Low	21	17 ^a	14 ^a	16 ^a	12	16 ^a
Yuma	29	31	32 ^a	35	36	36 ^a

a. Invalid annual average due to insufficient number of samples

b. Site Relocated Mid Year

c. Sampler type changed

d. Very few samples collected

Annual standard - 50 µg/m³ for a 3-year running average

FIGURE 9

